

are the presence of many miniaturized hairs 1 cm long or longer and the commitment to twice daily application of the drug.

In men, topical minoxidil may be effective over the entire thinning scalp area from the frontal region to the vertex. The greater the number of miniaturized hairs, the greater the potential for success. A bald scalp, where only forehead-type vellus hair remains, will not respond satisfactorily to minoxidil. The bitemporal recession area will also not respond to the drug.

In women with androgenetic alopecia, topical minoxidil solution also produces a substantial increase in partially enlarged hairs. Women whose scalps are visible and whose hairstyles allow their scalps to show will usually enjoy the improved scalp coverage achieved. Women who already wear a wig or who expect full dense coverage may not be satisfied with the limited effect of topical minoxidil, however.

Topical minoxidil is easy to use and appears to be completely safe in those with a normal cardiovascular state. Side effects consist mainly of skin irritation in a small number of patients, some of whom become allergic to the drug or to the propylene glycol in the vehicle.

Treatment with topical minoxidil must be continued indefinitely in androgenetic alopecia; otherwise, normal heredity takes over. Hence the expense of the drug must be considered before starting its use. If treatment is stopped, the newly stimulated growth is lost within one to two months. Not all patients maintain the initial level of hair growth even with continued treatment.

Topical minoxidil, with its real albeit limited effects, has ushered in a new era of hair growth-promoting agents by showing that reversal of androgenetic alopecia is achievable. It has greatly stimulated hair research, and in the future many other new treatments can be expected for this normal but unpopular hereditary trait.

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Using Cultured Keratinocytes for Treating Burns

THE IDEA OF USING keratinocyte cultures as skin grafts was first promoted nearly 40 years ago and was based on observations that keratinocytes grew out from pieces of human skin in explant culture in multilayered sheets reminiscent of epidermis. It is this ability of cultured keratinocytes to form an epidermis-like organ in vitro that allows the transfer of the cell sheets to recipients as epidermal allografts. Large-scale keratinocyte culture became feasible with advances in technology developed by Green and associates in 1975. The power of this technique to provide large amounts of autologous epidermis that would otherwise not be available was dramatically shown in 1984 when the Green group treated two pediatric burn patients with grafted cultured keratinocytes covering 49% and 54% of their body surface area. In full-thickness burns, spontaneous re-epithelialization is not

possible because skin adnexal structures are destroyed. The sources of conventional autograft skin are limited in severely burned patients by the lack of uninjured donor sites. Modern keratinocyte culture methods can generate enough epidermis in vitro to graft an adult's entire body surface area within three to four weeks.

Unfortunately, keratinocyte cultures alone replace only the epidermis; in full-thickness burns, the dermis is also lost. The long-term morbidity of major burn injury is primarily due to the scarring and contractures that result from damage to or loss of the dermis. For this reason, efforts to develop more comprehensive synthetic skin grafts that replace both the epidermis and the dermis have begun. The first such composite skin graft used to treat burns was developed by Cuono and colleagues in 1986. In this graft, allogeneic cadaveric dermis is engrafted and provides support for autologous keratinocyte cultures that provide the new epidermis. The reconstituted skin of this composite graft includes functional melanocytes and Langerhans cells in the epidermis. The dermal-epidermal junction, including anchoring fibrils, is fully reconstituted within weeks of graft placement. Three-year follow-up data indicate that this method results in a durable skin replacement with notably less scarring than would be expected from conventional grafting techniques. Analysis by DNA "fingerprinting" of engrafted cadaveric dermis indicates that allogeneic cells are largely replaced or absent within weeks of engraftment, although classic graft rejection is (fortunately) not observed. This composite method may be possible in severe burn patients because of the profound immunosuppression that accompanies the burn injury.

In 1983 Hefton and colleagues reported successful engraftment of allogeneic keratinocyte cultures onto burn patients. The use of such allogeneic cultures to treat serious burns would be advantageous because graftable tissue would be readily available in potentially limitless quantities. More recent evidence suggests that in partial thickness wounds in immunocompetent patients, allogeneic cultures may not be permanent but rather are gradually displaced by autologous keratinocytes from subjacent epidermal adnexae. As yet we do not know whether cultured allografts would persist if autologous epidermal elements are far removed from the graft site, as is the case in extensive full-thickness burns.

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Surgical Margins for Melanoma

THE QUESTION OF how wide a surgical margin is necessary when excising a melanoma less than 2 mm in thickness now appears to have been answered. The World Health Organization Melanoma Group designed a randomized prospective study with a large number of patients (703) that clearly shows that excisions with 1-cm cutaneous margins were as safe as wide excision margins (3 cm or more) in melanomas no